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Exploring the Relationship of a Gamified Assessment with Performance

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Abstract. Our study explores the validity of a game-based assessment method assessing candidates' soft skills. Using self-reported measures of performance, (job performance, Organizational Citizenship Behaviors (OCBs), and Great Point Average (GPA), we examined the criterion-related and incremental validity of a game-based assessment, above and beyond the effect of cognitive ability and personality. Our findings indicate that a game-based assessment measuring soft skills (adaptability, flexibility, resilience and decision making) can predict self-reported job and academic performance. Moreover, a game-based assessment can predict academic performance above and beyond personality and cognitive ability tests. The effectiveness of gamification in personnel selection is discussed along with research and practical implications introducing recruiters and HR professionals to an innovative selection technique.

In order to gain a competitive advantage and make a profit from their activities, organizations need a good strategy. But to gain a sustainable competitive advantage, that can last a long time and should not be easily imitated by competitors; organizations must have the people resources in place to successfully implement the strategy. Along these lines, the need to screen out talented prospective employees possessing the required skills to fit the job and meet the performance standards is apparent for every business. Traditional selection methods, such as general mental ability and personality tests, predict job performance to some extent (Ryan & Ployhart, 2014). A number of researchers have recently suggested that the use of gamification in personnel selection, such as game-based assessments, might predict job performance beyond traditional selection methods (e.g., Armstrong, Landers, & Collmus, 2016; Fetzer, Mcnamara, & Geimer, 2017). Game-based assessments is a new assessment method incorporating game elements in employee selection and is lately widely applied in personnel selection practice, raising questions about its ability to predict job performance. To the best of our knowledge, no published empirical research has established the effectiveness of game-based assessments in the employee selection process. Our study is designed to examine the potential of a game-based assessment in predicting a number of performance measures. Specifically, we test the relationship between a game-based assessment and performance criteria (e.g., perceived job performance, Grade Point Average-GPA, perceived Organizational Citizenship Behavior-OCB) to explore its criterion related validity. We also explore the extent to which a game-based assessment predicts performance beyond traditional selection methods (personality measures and cognitive ability).

Traditional selection tests and performance

Cognitive ability and personality tests are widely used nowadays by organizations in an effort to predict future work performance. Several studies and meta-analyses support not only the validity of cognitive ability and personality tests but also their effective combination in predicting job performance (Schmitt, 2014). Cognitive ability tests measure the levels of general cognitive ability or intelligence, as well as aspects of it (e.g., numerical, verbal, abstract, and spatial ability). Meta-analytic findings indicate that both general cognitive ability and specific cognitive abilities predict successfully performance and work-related outcomes (e.g. Ones, Dilchert, & Viswesvaran, 2012). Moreover, cognitive ability is supported to be the single best predictor of performance at work, as well as, of performance outcomes in the majority of job positions and situations (Schmitt, 2014). As far as personality is concerned, the most popular personality

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model is the five-factor model of personality (FFM) studied extensively in diverse countries and cultures around the world. The predictive validity of at least two key factors of the FFM (especially conscientiousness but also neuroticism) has been well established across different job positions and organizations, whereas, meta-analytic findings (Barrick, Mount, & Judge, 2001) have also supported the predicted validity of most personality dimensions of the FFM.

In the performance domain we often study criterion measures, such as academic attainment and OCB, apart from job performance. OCBs or extra-role performance are defined as the voluntary and non-mandatory employee behaviors that positively influence organizational effectiveness and contribute to the overall productivity of the organization (Smith, Organ, & Near, 1983). Both emotional and cognitive intelligence have been found to be related to organizational citizenship behaviors (e.g., Cote & Miners, 2006). Whereas, personality traits, such as agreeableness and conscientiousness, have been found to predict OCB as well (e.g., Chiaburu, Oh, Berry, Li & Gardner, 2011). Similarly, academic performance has been found to be significantly predicted by personality and cognitive ability. Academic performance is usually measured with student grades or grade point average-GPA, which is supported to predict performance at work (Roth, BeVier, Switzer, & Schippmann, 1996). A number of meta-analytic studies exploring the relationship between personality and academic performance supported that agreeableness, conscientiousness and openness to experience, as well as intelligence, predict academic performance (Poropat, 2009; Strenze, 2007). The relationship between cognitive ability and academic performance is also well established (Chamorro-Premuzic & Furnham, 2008). *"Academic performance has been the criterion for validating IQ tests for over a century, and one would hardly refer to these tests as "intelligence" measures if they did not correlate with academic performance"* (Chamorro-Premuzic & Furnham, 2008, p. 1597). It is worth reporting that both general cognitive ability and specific cognitive abilities (working memory, processing speed, spatial ability) can predict academic performance whereas, specific cognitive abilities can predict academic performance beyond general cognitive ability (Rohde & Thompson, 2007).

To sum up, there is a large body of research which indicates general mental ability and personality tests as important predictors of performance. However, traditional selection methods, such as personality tests, predict job performance to some extent, whereas, they are prone to faking and social desirability (e.g., Morgeson et al., 2007; Ryan & Ployhart, 2014). Phenomena, that the application of gamification in employee testing might restrain increasing thus the

assessment's predictive validity and utility in practise. Moreover, the advent of technology has started to render traditional selection methods obsolete, paving the way for more technologically advanced methods capable to reduce the cost of hiring and improve applicant reactions.

Game-based assessment methods and performance

Gamification, the application of game-design elements in non-game contexts (Armstrong et al., 2016), has recently caught the attention of researchers and practitioners in Work/Organizational Psychology and Human Resources Management, as a promising tool in employee selection. Employee testing methods have started to incorporate game elements and designs turning into assessments that are likely to be more fun and attractive to candidates, as well as more difficult to fake (Armstrong et al., 2016). The addition of game elements into the assessments might render the assessments more difficult for candidates to decode and identify what the correct answer is, as personality traits or intentions and behaviors are assessed indirectly. For example, in a gamified Situational Judgement Test (SJT) the clothing of the scenarios and answers with game elements might make the desirable behaviors less obvious to candidates and as a result, more difficult to distort intentionally or unintentionally what their reactions would be in a given situation as it is away from real life situations.

Moreover, building on the concept of *"stealth assessment"*, Fetzer et al. (2017) highlighted the potential of game-based assessments in predicting job performance. Stealth assessments can accurately and efficiently diagnose the level of students' competencies by extracting continuously performance data that are gathered during the course of playing/learning (Shute, Ventura, Bauer, & Zapata-Rivera, 2009). In other words, stealth assessment is an assessment that is *"seamlessly woven into the fabric of the learning or gaming environment so that it's virtually invisible…reducing thus test anxiety while not sacrificing validity and consistency"* (Shute, 2015, p. 63). Along these lines, a gamified assessment environment might distract candidates from the fact that they are assessed, reducing test anxiety and promoting behaviors that are more likely to appear unconsciously instead of the desirable or socially acceptable ones. Game engagement and the use of contexts diagnosing how an individual handled a given problem – similar to work-sampling techniques - might lead to more robust inferences about performance than traditional selection inventories that rely on self-reported measures (Fetzer et al., 2017). Taking into consideration all the evidence mentioned above, we aim to explore the effectiveness of the game-based assessment method

measuring four soft skills (i.e., resilience, adaptability, flexibility, and decision-making) by testing whether its dimensions are related to performance measures over and above traditional selection measures.

A major challenge that employers nowadays face when hiring young graduates is the lack of applicants with the right skills and competencies (Picchi, 2016, August 31). Among the most desirable soft skills that employers are looking for are adaptability, flexibility, decision-making, and resilience (e.g., Gray, 2016; McKinsey & Company, 2017). Resilience, the ability to bounce back from adversities (Luthans, 2002), might be vital for both personal and job effectiveness with numerous positive outcomes in work and academic settings. For example, resilient individuals are likely to have higher levels of job performance, job satisfaction and organizational commitment (e.g., Avey, Reichard, Luthans, & Mhatre, 2011), as well as, OCB (Paul, Bamel, & Garg, 2016). Moreover, students with higher levels of resilience are likely to demonstrate increased academic performance levels, as well as higher class participation, enjoyment and self-esteem (Martin & Marsh, 2006, 2008). Similarly, adaptability, the "*response or people's adjustment to changing environmental situations*" (Hamtiaux, Houssemand, & Vrignaud, 2013, p. 130) has positive outcomes in both academic and work contexts. For example, successful students (GPA of 80% or more) were found to have high levels of interpersonal, adaptability, and stress management skills (Parker et al., 2004). Moreover, high adaptability is related to positive relationships and behaviors in school, such as studying, leadership, and reduced school problems (Brackett, Rivers, Reyes, & Salovey, 2012). In the work context, adaptability is important in performing well, handling ambiguity, and dealing with uncertainty and stress (Kehoe, 2000). Whereas, "*volunteering to help co-workers (an aspect of OCB) might require one to adapt to changing co-worker behaviour*" (Ployhart & Bliese, 2006, p. 11). Similarly to adaptability, flexibility, defined as the individual's capacity to adapt, is likely to have positive outcomes in work, academic and job seeking settings (Golden & Powell, 2000). Individuals with high levels of flexibility are able to address different situations creating thus value to organizations instead of harming them because of their inability to adjust in changes (Bhattacharya, Gibson, & Doty, 2005). Moreover, OCB performers are likely to increase their flexibility in order to adjust to the requirements of various roles and settings at work displaying thus behaviors that contribute to organizational effectiveness (Kwan & Mao, 2011). Organizational success, especially in changing environments, depends also largely on effective decision-making, defined as an intellectual process leading to a response to circumstances through the selection among alternatives

(Nelson, 1984). Employees who are capable of effective decision-making devote effort to analyze information to better understand a company's threats, opportunities and options, consult other people and collaborate together in making decisions and act proactively in getting the things done, enhancing thus, organizational performance (Miller & Lee, 2001). Whereas, participation in decision-making leads to positive outcomes within educational settings, such as OCB (Somech, 2010).

Taking into consideration all the evidence mentioned above, we aim to establish the effectiveness of the gamified selection method that we developed by testing whether the gamified SJT dimensions are related to performance and in particular, to performance measures, OCB and GPA, over and above traditional selection measures (e.g., personality tests, cognitive ability); therefore, we state the following hypotheses.

H_1: Game-based assessment dimensions will be positive associated with participants' job performance scores.

H_2: Game-based assessment dimensions will be positive associated with participants' GPA.

H_3: Game-based assessment dimensions will be positive associated with participants' OCB.

H_4: Game-based assessment dimensions will provide incremental validity above and beyond the effect of cognitive ability and personality in predicting participants' job performance scores.

H_5: Game-based assessment dimensions will provide incremental validity above and beyond the effect of cognitive ability and personality in predicting participants' GPA.

H_6: Game-based assessment dimensions will provide incremental validity above and beyond the effect of cognitive ability and personality in predicting participants' OCB.

Method

Sample & Procedure

The study was conducted in Greece during the last months of 2017, attracting participants via the authors' university career office, along with post-graduate and final-year undergraduate students or recent graduates. We contacted final-year undergraduate students, graduate students or recent graduates to participate in a survey about a selection method, as these students were approaching graduation and were likely to search for employment soon (e.g., van Iddekinge, Lanivich, Roth, & Junco, 2016).

The data collection took place in two phases. In the first phase, participants were invited to complete the self-reported measures of cognitive ability, personality,

performance measures and OCB. Three to four weeks after completion, participating individuals of the first phase were invited to play the game-based assessment. 193 participants took part in the first phase and 120 of them participated in the second phase, as well, a response rate of 62%. The majority of them were females (64%) with a mean age of 26 years. As far as their education level is concerned, 46% of the participants were final year undergraduates, 15% were post-graduate students, another 15% were university graduates and 24% had already acquired a post-graduate degree. Most of them (55%) were currently employed, working in entry-level (57.5%) or middle-level positions (27.5%).

Measures

Cognitive ability. This was measured with items taken from the International Cognitive Ability Resource (ICAR) (2014),[1]. ICAR is a public-domain and open-source tool created by Condon and Revelle (2014), aiming to provide a large and dynamic bank of cognitive ability measures for use in a wide variety of applications, including research. The test includes four item types: Three-Dimensional Rotations, Letter and Number Series, Matrix Reasoning, and Verbal Reasoning. We used the 11 Matrix Reasoning items, which contain stimuli similar to those used in Raven's Progressive Matrices, and which is also more closely related to abstract reasoning. "The stimuli are 3x3 arrays of geometric shapes with one of the nine shapes missing. Participants are instructed to identify which of six geometric shapes presented as response choices will best complete the stimuli" (ICAR, 2014, p. 2).[2] It is worth noting that the correct answer is only one, whereas the options "None of the above" and "Do not know" are also available. An overall score is calculated, with high scores indicating higher levels of cognitive ability[3].

Personality. Participants completed the 50 items International Personality Item Pool (IPIP; Goldberg et al., 2006) to assess the Five-Factor model of personality. Each scale consisted of 10 items. Standard IPIP instructions were presented to participants, who responded on a 5-point Likert-type scale ranging from 1 (*inaccurate*) to 5 (*accurate*). Research has reported good internal consistencies for IPIP factors (see, for example, Lim & Ployhart, 2006). In our study, reliability estimates were .81 for conscientiousness, .83 for emotional stability, .83 for extroversion, .79 for agreeableness, and .75 for openness to experience.

Performance measures. Overall job performance was self-evaluated by working individuals only using a measure used by Nikolaou and Robertson (2001). It consists of six items where the individual has to indicate whether she/he agrees or disagrees with the behavior described in a five-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). An overall job performance score was calculated by averaging the scores of the six items eliciting internal consistency reliability of .91. Example items include "*Achieve the objectives of the job*" and "*Demonstrates expertise in all aspects of the job*". We also asked participants to indicate their GPA from their first degree in order to use it as an alternative to job performance for non-working individuals. The range of the grading system in Greek public universities is 0.00–10.00 (Excellent = 8.50–10.00, Very Good = 6.5–8.49, Good = 5.00–6.49, and Fail = 0.00–4.59). The GPA reported by participants was the average grade awarded for the duration of their bachelor studies.

Organizational Citizenship Behavior (OCB). OCBs were self-evaluated by working individuals only using a measure developed by Smith et al. (1983). It consists of 16 items where the individual has to indicate whether she/he agrees or disagrees with the behavior described in a five-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The original scale measures two sub-scales; altruism and generalized compliance. However, for the purposes of the current study we only used the overall OCB score eliciting internal consistency reliability of .70. Example items include "*I help other employees with their work when they have been absent*" and "*I exhibit punctuality in arriving at work on time in the morning and after lunch breaks*".

Soft skills. We used a Game-Based Assessment (GBA) developed by Owiwi[4] in order to measure the four soft skills evaluated by the game, namely resilience, adaptability, flexibility and decision-making. The four skills are evaluated following a SJT methodology converted into an on-line game environment, with fictional characters. The Owiwi game has demonstrated satisfactory psychometric elements and increased equivalence with the originally developed SJT measuring the four soft skills (Georgiou, Nikolaou, & Gouras, 2017). Resilience is defined as "*the developable capacity to rebound or bounce back from adversity, conflict, and failure or even positive events, progress, and increased responsibility*" (Luthans, 2002, p. 702), "*Adaptability is related to change and how people deal with it; that is to say, people's adjustment to changing environments*" (Hamtiaux et al., 2013, p. 130). Flexibility is defined as the demonstration of "*adaptable as opposed to routine behaviors; it is the extent to which employees possess a broad repertoire of*

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1. http://icar-project.com/

2. https://icar-project.com/ICAR_Catalogue.pdf

3. For an example item visit https://icar-project.com/ICAR_Catalogue.pdf

4. www.owiwi.co.uk

behavioral scripts that can be adapted to situation-specific demands" (Bhattacharya et al., 2005, p. 624) and finally decision-making is defined as an intellectual process leading to a response to circumstances through selection among alternatives (Nelson, 1984). Individualized feedback is provided to all participants upon completion of the game.

Results

Table 1 presents the inter-correlation matrix of the study's variables. An interesting pattern we observe in the inter-correlation matrix, is that the cognitive ability measure is not associated with any of the scales measured here. Also, the self-reported job performance measure is correlated significantly with conscientiousness, emotional stability and openness to experience for the five-factor model of personality. Moreover, the OCB measure is associated with agreeableness, similarly to past research on the relationships between agreeableness and OCB, but not with conscientiousness. Finally, the soft skills assessed by the game-based assessment, which is the main focus of the current study, are not correlated with any of the criterion measures, with the exception of the positive correlation between GPA and decision making, rejecting thus H_1 and H_3 and only partially confirming H_2.

Next, we proceed with the examination of our research hypotheses. Our main focus in this study is the suitability of the game-based assessment as a selection tool, above and beyond the well-established effect of cognitive ability and personality, especially conscientiousness. Our first three hypotheses deal with the association between game-based assessment and the three performance criteria. In order to explore these hypotheses we executed three separated multiple

regression analyses for each one of the three criterion measures. The results of these analyses are presented in Table 2.

The results of the regression analyses show that flexibility and decision-making are positively associated with self-reported job performance and GPA respectively. The block of the four skills predict 13%, 7% and 10% of the total variance in job performance, OCB and GPA respectively. Therefore, H_1 and H_2 are partially confirmed, whereas H_3 is rejected. Subsequently, we explored the incremental validity of the game-based assessment. In order to explore H_4-H_6 we conducted a number of hierarchical regression analyses, controlling for the effect of cognitive ability and the five-factor model of personality. The results of these analyses are presented in Table 3.

The results of these analyses demonstrate that the soft skills measured by the game-based assessment do not predict additional variance in either job performance or OCBs for the working individuals of our sample, above the effect of cognitive ability and personality rejecting thus H_4 and H_6. However, they seem to have an important effect on GPA. More specifically, both as a group and separately (adaptability and decision making) demonstrate a statistical significant relationship with GPA, above and beyond the effect of cognitive ability and personality. These results establish the usefulness of game-based assessments in predicting educational attainment, as measured by the GPA, both as a group and individually in the case of adaptability and decision making.

Discussion

Our study explores the effectiveness of a game-based assessment in employee selection. Extending previous

Table 1. *Inter-Correlation Matrix of Study's Variables (N = 63–120)*

Scales	Range	$\bar{x}$	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Cognitive ability	11	7.69	2.33													
2. Extroversion	36	34.07	7.87	–.03												
3. Agreeableness	25	42.05	5.32	.08	.47**											
4. Conscientiousness	35	38.42	7.10	–.05	–.16	.00										
5. Emotional Stability	33	29.15	7.67	.07	.20*	.14	.21*									
6. Openness to experience	29	36.78	6.07	.40	.16	.20*	.04	–.05								
7. Resilience	58	76.35	11.85	.10	.04	.11	.14	.31	.32**							
8. Flexibility	58	64.98	12.71	.05	–.03	.11	.07	.13	–.02	.20*						
9. Adaptability	81	74.57	11.60	.03	.01	.07	–.12	–.09	.08	.40**	.26**					
10. Decision-making	46	76.42	9.49	–.00	.05	.12	.08	.12	–.03	.23*	.03	.20*				
11. Job Performance	14	26.21	3.07	.13	.04	.16	.40**	.26*	.32**	.13	.22	–.07	.13			
12. OCB	38	64.77	6.78	.05	.22	.39**	.14	.19	.05	–.14	–.03	–.18	.12	.26*		
13. GPA	3.1	7.39	0.72	.03	–.06	–.11	.13	–.03	.00	–.02	.08	–.18	.25**	–.02	.07	
14. Age	25	26.36	6.21	.07	–.18*	.03	.11	–.04	.10	.12	.19*	.11	–.12	.22	–.07	–.04

*Note: *p < .05. **p < .01. ***p < .001.*

Table 2. *Hierarchical Regression Analysis of the GBA on the Three Criterion Measures*

GBAs	Job Performance (N = 63)				OCB (n = 63)				GPA (N = 113)			
	B	t	ΔR^2	ΔF	β	t	ΔR^2	ΔF	β	t	ΔR^2	ΔF
Resilience	.14	.94	.13	2.10	−.12	−.79	.07	1.10	−.16	−1.58	.10	3.06
Flexibility	.30*	2.20			.08	.58			.06	.58		
Adaptability	−.28	−1.85			−.18	1.14			.18	1.76		
Decision making	.17	1.29			.20	1.47			.25**	2.61		

Note: OCB = Organizational Citizenship Behavior; GPA = Great Point Average.
*p < .05. **p < .01. ***p < .001.

Table 3. *Hierarchical Regression Analysis of the GBA on the Three Criterion Measures controlling for Cognitive Ability and Personality*

Predictors	Job Performance (N = 63)				OCB (n = 63)				GPA (N = 113)			
	β	t	ΔR^2	ΔF	β	t	ΔR^2	ΔF	β	t	ΔR^2	ΔF
Step 1												
Cognitive ability	.04	.30	.26	332.**	.01	.10	.20	2.33*	.09	.92	.04	.70
Extroversion	−.05	−.30			.09	.55			.08	.77		
Agreeableness	.08	.53			.35*	2.27			−.20	−1.86		
Conscientiousness	.28*	2.07			.18	1.26			.18	1.83		
Emotional Stability	.06	.44			.08	.60			−.07	−.73		
Openness to experience	.30**	2.44			.02	.12			.02	.20		
Step 2												
Resilience	−.02	−.15	.06	1.11	−.17	−1.05	.03	.57	−.20	−1.84	.12	3.73**
Flexibility	.26	1.9			−.03	−.24			.07	.71		
Adaptability	−.19	−1.30			−.04	−.23			.22*	2.07		
Decision making	.16	1.15			.03	.19			.26s	2.73		

Note: OCB = Organizational Citizenship Behavior; GPA = Great Point Average.
*p < .05 **p < .01. ***p < .001.

research on Work/Organizational Psychology and traditional selection methods, we introduce a game-based assessment designed to measure candidates' soft skills (e.g., adaptability, flexibility, decision-making) that is found to be associated with self-reported measures of performance. Our study contributes to employee selection research, providing some support to the use of gamification in soft skills assessments and their ability to predict performance in work and academic settings. For example, a game-based assessment measuring soft skills, such as decision-making and flexibility, can predict test-takers' self-reported job performance and GPA. By incorporating game elements into assessments that do not use self-reported measures, but assess behavioral intentions, test-takers' attractiveness and engagement into the assessment might be enhanced, while it might be more difficult for them to understand what is being assessed and what the correct answer is (Armstrong et al., 2016; Fetzer et al., 2017). As such, the use of game elements and designs might improve the validity of assessments.

Moreover, Armstrong et al. (2016) suggested that game-based assessments, such as gamified simulations, might be employed to assess important predictor constructs like learning agility in employee selection settings where survey methodology may not be adequate. Along these lines, our study extends research on traditional selection methods, exploring the incremental validity of a game-based assessment assessing soft skills. Game-based assessments measuring soft skills, such as adaptability and decision making, can predict academic performance (e.g., GPA), above and beyond traditional selection methods (e.g., cognitive ability and personality tests). However, the soft skills measured by the game-based assessment do not predict additional variance in either job performance or OCBs, above the effect of cognitive ability and personality.

To sum up, both personality and intelligent tests have been extensively tested in academic contexts and their validity in predicting GPA has been established. The emergence of internet and technology as well as

the familiarity of new generations with games are likely to reflect an increasing interest in the validity of game-based assessments in predicting academic performance beyond traditional selection methods. The additive value of using a game-based assessment measuring adaptability and decision making, both as a group and individually, in predicting GPA beyond personality (e.g., FFM) and cognitive ability tests (e.g., ICAR), has been established.

Our results are of interest to researchers and practitioners of Work/Organizational Psychology interested in the prediction of work and academic performance, in that they support the incremental validity of a game-based assessment over and above traditional selection methods. They contribute to empirical unknowns about the psychometrics properties and effectiveness of the use of game-based assessments in employee selection.

Game-based assessments might be used as a supplement or replacement tool to traditional selection methods as they add to the prediction of performance of candidates or students. However, it is of high importance to test the effectiveness of game-based assessments using objective measures of performance, such as supervisor's ratings, and a test-retest reliability methodology to establish further the psychometric properties of the new assessment method. Moreover, similar to SJTs, game-based assessments might improve the information gathered about applicants during the selection process as well as applicant reactions (Armstrong et al., 2016). Gamification might increase engagement levels which in turn might lead to retention and motivation during the process of selection as well as better predictions about person-job fit (e.g., Chamorro-Premuzic, Akhtar, Winsborough, & Sherman, 2017). Using new technologies and game elements in assessments, recruiters and HR professionals might improve selection decisions making more robust inferences about their performance as game-based assessments do not use self-reported measures that applicants are likely to fake (Fetzer et al., 2017).

Another reason that the use of traditional selection methods might be reconsidered and replaced by new game based tools is that the latter are popular among younger generations. Organizations including game-based assessments into the employee selection process might provide a new technologically advanced experience to applicants sending thus signals about organizational attributes (e.g., innovation) and making the process more fun.

The present study is not without limitations. First of all, performance outcomes were assessed via self-report measures. Although it is suggested that objective measures are the best indicators of individual employee performance, the unavailability of such

measurements has forced many previous studies to use self-reported measures of performance (Pransky et al., 2006). The use of objective measures or supervisor's report of employee' performance would lead to more robust findings about the predictive validity of the game-based assessment. Also, some of the GBA's dimensions were not found to predict performance. One reason might be the use of self-reported measures of performance. *"It is likely that self-report and objective measures provide information on distinct, different aspects of work performance. Objective measures, even in jobs that are apparently routine and straightforward, can present challenging levels of complexity, and may provide an estimation of only one dimension of actual job performance."* (Pransky et al., 2006, p. 396). Future research should explore the ability of the GBA to predict one dimension of performance (e.g., resilience or adaptability) using supervisory ratings or objective performance data.

To establish further the effectiveness of the use of gamification in employee selection, future research should also explore applicants' reactions. For example, candidates perceive multimedia tests as more valid and enjoyable and as a result, they are more satisfied with the selection process while organizational attractiveness and positive behavioral intentions are increased (Oostrom, Born, & van der Molen, 2013). The impact of game-based assessments on perceived fairness, organizational attractiveness and job pursuit behaviors should also be investigated to support further their suitability in the selection process. Also, the current study does not address competence and previous experience with technology, which might influence test-takers' performance. For example, candidates who have experience with on-line games and/or feel competent to use new technology might have less anxiety when new technology is used (Cascio & Montealegre, 2016), and as a result, perform better in a game-based assessment. In general, the limited knowledge and lack of empirical research on the use of gamification in employee selection has made the establishment of a game-based assessment as an effective selection method even more challenging.

Future research should also explore the role of demographic variables on individuals' performance in game-based assessments. Instead of using demographic variables simply as mere control variables in theory testing, Spector and Brannick (2011) suggest to rethink the use of demographics in the first place focusing on the mechanisms that explain relations with demographics rather than on the demographic variables that serve as proxies for the real variables of interest.

Finally, the study might suffer from common method variance effects, since we only used self-reported measures. In order to reduce its effect, we asked the

participants to complete the measures in two separate occurrences. Moreover, the Harman's single factor test we conducted following the guidelines of Podsakoff, Mackenzie, Lee, and Podsakoff (2003) discouraged the impact of common method variance on our results.

Game-based assessments have recently appeared in employee selection calling for further research on their validity. Our study contributes to research on employee selection methods by examining the criterion related validity of a game-based assessment measuring soft skills. Findings of our study indicate that assessments incorporating game elements might predict self-rated job performance, and academic performance, as measured by GPA. Moreover, exploring the incremental validity of the game-based assessment method, we provided evidence that it can predict GPA above and beyond the effect of traditional selection methods, such as personality and cognitive ability tests. These results could change the way organizations and colleges approach traditional assessment methods making the use of gamification in work and academic contexts more widespread in the future.

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